

EFFECT OF LOCAL INFLUENCES IN MODIFYING THE GENERAL ATMOSPHERIC CONDITIONS<sup>1</sup>

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Central Wisconsin soils are mainly light texture, being mainly sands, while north and south of this area the soils are heavier, being mainly silt loams. A statistical study was made of the rainfall and temperature data obtained by the United States Weather Bureau at many stations to ascertain if the sandy nature of the soils in central Wisconsin exerted any marked influence on these two climatic factors.

In 1906 A. J. Henry referred to a 4-inch smaller annual rainfall in the vicinity of the Winnebago basin as compared to surrounding points, and emphasized the fact that this was based on only a 10-year period of observation, which he considered too short to determine whether this discrepancy was actual or only apparent.

The records first used in this analysis were for stations in and out of the sandy area from the time of the establishment of the Weather Bureau stations to 1920, inclusive. The rainfall records were compared by taking the total annual, April to September, or the growing season, and also just for the month of August, as it is thought by some that during this month the weather in Wisconsin is less subject to the influence of cyclones or thunderstorms. No consistent differences were found to have taken place in and out of the sandy area. One reason for this is the shortness of the records and the occasional heavy rainfall which may come at just one of the stations. As an illustration, in June, 1914, at Hancock in the sandy area the total precipitation was 11.75 inches, while at Madison in the silt loam area to the south it was 3.46, and at Merrill in the silt loam area north of Hancock it was 7.10 inches.

In comparing the temperature records for stations in the silt loam areas north and south of the sandy area with those in the sandy area from the time of the establishment of the stations to 1920, inclusive, it appeared at first that the temperatures were higher in the sandy area than one would expect to be the case, i. e., they were nearer to those of stations lying south of it than to those of stations which were practically the same distance north of it.

The stations chosen in the sandy area were Hancock, Wisconsin Rapids, Stevens Point, Meadow Valley, Mather, Valley Junction, and Hatfield, and the length of the record for these varied from 17 to 28 years. The only one of these stations where there was a wide deviation in the mean monthly temperature was at Mather. The mean annual temperature at Mather was 42° F. and at Hancock 44.4° F., while at the other stations it varied from 43.3° F. to 43.7° F. The lower temperature at Mather was due, no doubt, to the fact that this station is located in a swampy area.

In comparing the temperature data of one station with those of another in this work, corrections were always made for differences in altitude.

As the nature of the soil is likely to have an influence only during those months when there is no snow cover, a further study was made of the temperatures during the growing season, April to September, inclusive. On this basis the sandy area when compared with the silt loam areas had no marked temperature differences when allowances were made for differences in latitude. In comparing the mean August temperatures, the sandy area seemingly had a higher temperature than what would be considered the mean.

The next comparison was made by selecting stations in the sandy area with those in the same latitude in Minnesota, where the soils in general are heavier. The records for the years 1913-1919, inclusive, were used, for during this period, according to the records the thermometers at the stations selected were not moved. The temperature for the growing season and the departures from the latitude mean were determined and corrections made for differences in altitude. The temperatures during the growing season at Hancock, which is located in the more typical portion of the sandy area, were on this basis above the latitude mean. This was also true for the mean maximum temperatures as well.

It appeared after these studies that due to the varying results perhaps detailed information was lacking relative to the immediate surroundings of the thermometers. By personal visit to Hancock it was ascertained that between 1910-1921 the thermometers were not at the location referred to in the published records, but were on a sheet-iron lean-to at the rear of a two-story frame building. While the thermometers were on this lean-to the average temperatures at Hancock during the growing season were higher than from 1905-1910, when they were over sod, or from 1922-23, when they were also located over sod. This was determined not by simply comparing the data for Hancock, but by analysis of the records at other central Wisconsin stations during all three periods.

With the thermometers at the present location at Hancock over sod no appreciable effect of the sandy nature of the surrounding soil is apparent.

If the conditions of sandiness and relative lack of cover do affect temperature at all, the effect is too small to be shown in the observations made by the Weather Bureau. If it were possible to place thermometers with greater care and with better location for the purpose it might be possible to show a small effect of soil texture. No effect that the sandy nature of the soil might have on the rainfall of this section can be detected in the data that is at present available.

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